

**THE NON-INDIGENOUS LYCTOCORIDAE AND ANTHOCORIDAE  
(HEMIPTERA: HETEROPTERA: CIMICOIDEA) OF AMERICA NORTH  
OF MEXICO**

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*Abstract.*—Eighty-four species of Lasiochilidae, Lyctocoridae and Anthocoridae (Cimicoidea) are known to occur in America north of Mexico. Twenty-six of these are believed to have been introduced (31%). Each non-indigenous species is reviewed and appropriate literature cited. While some species were introduced for possible biological control, others have been introduced accidentally.

*Key Words:* Lasiochilidae, Lyctocoridae, Anthocoridae, Cimicoidea, Canada and United States species, distribution, and biology

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Insects and other organisms have been introduced throughout the world, accidentally or deliberately. The late Charles S. Elton published his pioneer book “The Ecology of Invasions by Animals and Plants” in 1958. Among the insect examples he cited are the winter moth in northeastern North America, elm bark beetle, Japanese beetle, European gypsy moth, sawflies, and even a true bug — *Stephanitis rhododendri*, in this case introduced from North America into Europe, as was the Colorado potato beetle. Other insects have been introduced into Canada and the United States more recently, including the Asian gypsy moth, cereal leaf beetle, blue alfalfa aphid, Russian wheat aphid, and the pine shoot beetle.

Parsons (1983) dealt with the evolution of colonizing species. Mooney and Drake (1984) edited a comprehensive review of some biological invasions, treating the details of invasion and their consequences. The Office of Technology Assessment of the U.S. Congress pub-

lished “Harmful Non-Indigenous Species in the United States” in 1993. This was a comprehensive treatment of a variety of introductions and their consequences. The use of the term non-indigenous species follows that publication. Some other books published over the past few years on introductions and their consequences include Simberloff et al. (1997), Devine (1998), Cox (1999), Mooney and Hobbs (2000), Ruiz and Carlton (2003), Coombs et al. (2004), Cox (2004) and Mooney et al. (2005). The impact of exotic species on our environments has been enormous. Some of these species have been with us for many years at considerable cost.

Eighty-four species of Lasiochilidae, Lyctocoridae and Anthocoridae (Cimicoidea) are known to occur in America north of Mexico. Twenty-six of these are considered to be non-indigenous (31%). Some were introduced deliberately and others accidentally, usually involving the activities of human beings. Earlier, Lattin (1993) reported 90 species from

America north of Mexico, of which 12.2% were considered to have been introduced, whereas Canada reported 42 species of which 10 (23.8%) were considered introduced. Lattin (1999b, 2000) provided overviews of the Anthocoridae (sensu lato). This publication follows the treatment of families and tribes of the Lasiocbilidae, Lyctocoridae and Anthocoridae by Schuh and Štys (1991) and Schuh and Slater (1995). Scudder and Footitt (2006) included the Anthocoridae in their extensive review of the introduced true bugs in Canada. Appropriate references to each species treated here include the date, site of original description, geographic and biological references. Every species that has been reported as a deliberate introduction for biological control purposes has been cited, including those that have not become established. It is the purpose here to record all such species as a data base of past introductions. Stanaway et al. (2001) examined 3,001 empty sea cargo containers in Australia. They recovered over 7,400 living and dead insects from 1174 containers, including 23 specimens of Anthocoridae, 17 of which were still alive. These sea cargo containers now being used world wide have opened yet another pathway of introduction.

#### LYCTOCORIDAE

*Lyctocoris campestris* (Fabricius 1794) was described from Europe and first reported from America north of Mexico by Dallas (1852) as *Xylocoris americanus*. Sands (1957) illustrated the egg and nymph, and Anderson (1962b) listed it from the Pacific Northwest. Kelton (1967) recorded it from Alabama, British Columbia, Colorado, Florida, Georgia, Idaho, Illinois, Kansas, Manitoba, Maryland, New York, North Carolina, Ontario, Oregon, Pennsylvania, Quebec, South Carolina, Texas, Utah, Wisconsin and Mexico. Péricart (1972) published an

account of *L. campestris* in the western Palearctic, Henry (1988) summarized its occurrence in Canada and the continental United States, and Lattin (2000) reviewed *L. campestris* and its economic importance. This species has been introduced into many parts of the world where it has often been associated with domestic animals, stored-grain, and other products. *Nesidiocheilus hawaiiensis* Kirkaldy, 1902 is considered a synonym of *L. campestris* (Lattin 2006a).

#### ANTHOCORIDAE

##### Anthocorini

*Acomporis pygmaeus* (Fallén 1807) was described from Europe. Sands (1957) illustrated the egg and nymph and Péricart (1972) published on it in the western Palearctic. Kelton (1977) first reported *A. pygmaeus* from America north of Mexico from New Brunswick and Nova Scotia and later added Ontario and Prince Edward Island (Kelton 1978). Henry (1988) and Maw et al. (2000) cited these provinces. Scudder and Footitt (2006) reported this species from New Brunswick, Nova Scotia, Ontario, and Prince Edward Island. The species is associated with conifers.

*Anthocoris confusus* Reuter, 1884 was described from Europe. Procter (1946) first reported this species from North America based on specimens from Maine. Sands (1957) illustrated the egg and nymph and Anderson (1962a) described the bionomics of the species in England. Anderson and Kelton (1963) added Ontario and Tennessee. Péricart (1972) published on the species in the western Palearctic. Kelton (1978) reported the species from Maine, Nova Scotia, Ontario, Prince Edward Island, and Tennessee. Scudder (1986) added British Columbia and Henry (1988) summarized the above cited localities. Barnes et al. (2000) cited Nova Scotia and Maw et al. (2000) listed British

Columbia, Nova Scotia, Ontario. Lattin (2000) discussed the economic aspects of this species in detail and Scudder and Foottit (2006) reported this species from British Columbia, Nova Scotia, Ontario, and Prince Edward Island.

*Anthocoris nemoralis* (Fabricius 1794) was described from Denmark. Sands (1957) illustrated the egg and nymph and Anderson (1962a) published on this species in England. Anderson and Kelton (1963) first reported it from North America from Ontario. McMullen and Jong (1967) recorded it from British Columbia and McMullen (1971) reported the release of 163 specimens from Switzerland in 1963 into British Columbia. Péricart (1972) provided a review of *A. nemoralis* in Europe. Brunner and Burts (1975) raised *A. nemoralis* in the laboratory in Washington. The initial individuals for this rearing came from British Columbia. Henry (1988) reported *A. nemoralis* from British Columbia and Ontario. Hagen and Driestadt (1990) and Driestadt and Hagen (1994) cited its occurrence in California. Lattin (2000) reviewed the activities of the species and Horton et al. (2004) published a detailed discussion of *A. nemoralis* as a biological control agent, particularly as a predator of the pear psylla. Scudder and Foottit (2006) reported this species from British Columbia and Ontario.

*Anthocoris nemorum* (Linnaeus 1761) was described from Europe. Hill (1957) studied its biology in Scotland, Sands (1957) illustrated the egg and nymph, and Anderson (1962a) reported on this species in England. Péricart (1972) provided an account in the western Palearctic. Two specimens from Switzerland were introduced into British Columbia in 1963 (McMullen 1971), but it did not become established.

*Anthocoris pilosus* (Jakovlev 1877) was described from Europe. McMullen (1971) reported ten specimens brought

to Canada from Switzerland and released but the species failed to become established (L. Humble, Canada, personal communication). Péricart (1972) published on this species under the name *Anthocoris sibiricus* Reuter (1875). Later, he recognized that two species were involved - *A. pilosus* in the western and *A. sibiricus* in the eastern Palearctic (Péricart 1996).

*Macrotrachelia nigronitens* (Stål 1860) was described from Brazil (Rio Janeiro). It was reported from Panama by Champion (1900). Davis and Krauss (1966) introduced it into the Hawaiian Islands (as *Macrotrachelia thripiformis*) as a possible biological control agent but it failed to become established (Lattin 2007). Lewis et al. (2005) reported finding specimens at Riverside, California on *Ficus* galls. This was the first record of *M. nigronitens* from America north of Mexico.

*Tenmostethus gracilis* Horváth, 1907 was described from Germany and Péricart (1972) published on it in the western Palearctic. Kelton (1977) first reported it from North America, based on specimens collected in Nova Scotia. No additional localities have been recorded (Kelton 1978; Henry 1988; Maw et al. 2000; Scudder and Foottit 2006).

*Tetrphleps abdulghani* Ghauri, 1964, was described from Pakistan. It was introduced into America north of Mexico as a possible biological control agent against the balsam woolly aphid (*Adelges piceae* (Ratz)). Mitchell and Wright (1967) reported it as *Tetrphleps* sp. and stated that it had been released in Oregon and Washington. Clark et al. (1971) reported that 4622 individuals were released in Nova Scotia and New Brunswick and 1226 in British Columbia from 1962–1965. They indicated that 1436 individuals were released from cages in New Brunswick from 1962–1965. Clausen (1978) cited its introduction into the Pacific Northwest from

Pakistan and India. L.M. Humble, of Canada (personal communication 2 March 1990) stated that no establishment occurred and R.E. Mitchell, retired from the U.S. Forest Service, indicated per personal communication on 22 June 2001 that none of the introductions into United States were successful. Maw et al. (2000) stated that this species was introduced into Canada but failed to become established.

*Tetraphleps raoi* Ghauri, 1964, was described from Assam. Mitchell and Wright (1967) reported that it had been introduced into Oregon and Washington. Clark et al. (1971) cited the open release of 118 specimens into Nova Scotia and 2,457 specimens were released from cage and laboratory studies in New Brunswick in 1963 and 1965. Maw et al. (2000) stated that the species did not become established.

#### DUFOURIELLINI

*Amphiareus constrictus* (Stål 1860) was described from Brazil (Rio Janeiro). Blatchley (1926) first recorded the species from America north of Mexico based on specimens from Dunedin, Florida. Henry (1988) reported it from Florida and considered it transtropical. Lattin and Lewis (2001) stated that it had been intercepted on shipments of orchids at San Francisco, California, and clarified previous citations.

*Brachysteles parvicornis* (Costa 1847) was described from Italy. Péricart (1972) reviewed it in the western Palearctic. Asquith and Lattin (1990) published the first record from America north of Mexico based on specimens from New Jersey and New York. Lattin and Asquith (1991) added Massachusetts and Maine and Lattin (1993), Nova Scotia, as did Scudder and Footitt (2006). This small predatory bug feeds on mites on conifers in northeastern Canada and the United States.

*Buchananiella continua* (White 1880) was described from the island of Madeira. It was first reported from California under the name *Cardiastethus cavicollis* Blatchley, 1934, and later synonymized by Lattin et al. (2001) with *Buchananiella continua*. Péricart (1972) reviewed this species in the western Palearctic. Brenner and Lattin (2001) reported it for the first time from the Hawaiian Islands. Kirby (1999) reported *B. continua* from Great Britain for the first time and Verdcourt (2005) stated that specimens were found in sacks of compost in the same country. Whitehead (2005a, b) subsequently reported the further spread of this species in Britain — invasions still occur!

*Cardiastethus luridellus* Fieber (1860) was described from Pennsylvania. No further localities were listed until Lattin (1999a) reported it from Michigan where it was collected from clusters of dead oak leaves from fallen trees. Lattin and LaBonte (2002) documented its recovery from baited traps at a site handling raw wood at The Dalles, Oregon in 2000. The same species was recovered at Portland, Oregon, from a similar trap in 2004. *Cardiastethus luridellus* is considered to be a non-indigenous species in Oregon — well removed from its natural range. It is not yet known if the species is free-living in the Portland area or periodically reintroduced.

*Dufouriellus ater* (Dufour 1833) was described from Europe. Van Duzee (1916) first reported it in America north of Mexico ("E."). Blatchley (1928) listed California and Kentucky and Anderson (1962b) added British Columbia and Idaho. Péricart (1972) discussed this species in the western Palearctic. Kelton (1978) added Ontario and Henry (1988) reported North Carolina and New York. Lattin (2000) discussed *D. ater* and included references to its economic role (e.g., Arbogast 1984, Awadallah et al. 1984). It is taken under the bark of trees but also is associated with stored products.

*Physopleurella mundula* (White 1877) was described from the Hawaiian Islands (as *Cardiastethus mundulus*). Blatchley (1925) first reported it from America north of Mexico (Florida) (as *Physopleurella floridana* Blatchley), and later recorded it from Jamaica (1928). Blatchley's species was synonymized with *Physopleurella mundulus* (White) by Lattin (2005). Thus far, Florida is the only known site in North America.

#### ORIINI

*Macrotracheliella nigra* Parshley (1917) was described from Massachusetts. Anderson (1962b) recorded it from British Columbia. Kelton (1978) reported it from British Columbia, Manitoba, Ontario, Quebec and Nova Scotia. Henry (1988) listed Arkansas, Florida, New Jersey, New York and Rhode Island, and Maw et al. (2000) added New Brunswick. Lewis et al. (2005) found it in Montana and Washington. Paine (1992) cited its occurrence in southern California where it was found feeding on thrips on *Ficus*. It is believed to have been introduced earlier into California as a potential biological control agent against the thrips on *Ficus* (Paine 1992). The occurrence out of its normal range, coupled with the likely deliberate introduction, qualifies the species as non-indigenous in California.

*Montandoniola moraguesi* (Puton 1896) was described from Spain. Carayon and Remade (1962) published an account of the species in France. Herring (1966a) clarified the name for this predator of the Cuban laurel thrips. Davis and Krauss (1966) introduced this bug from Manila, Philippines, into Oahu, the Hawaiian Islands. It quickly became established as a predator of the thrips on *Ficus* and spread to other islands. Péricart (1972) reviewed it in the western Palearctic. Clausen (1978) reported on its introduction into California from Hawaii in 1966–1967 as a potential predator of the

Cuban laurel thrips. According to Paine (1992), it did not become established in that state. Reimer (1988) reported that *M. moraguesi* became a predator on a species of thrips introduced into the Hawaiian Islands to help control an introduced weed, and referred to this condition as biotic interference. Recently, Bennett (1995) reported its accidental occurrence in Florida. The bug had been feeding on thrips of an unwanted *Ficus*. He introduced this bug into Texas as possible thrips control on ornamental *Ficus* in shopping malls! Dobbs and Boyd (2006) have provided a detailed study of the distribution of *Montandoniola moraguesi*, its host thrips and their host plants in the United States (Alabama, Florida, Louisiana and Mississippi). This work establishes an excellent base for future work.

*Orius insidiosus* (Say) (1832) was described from eastern United States. Kelton (1963) reviewed the genus *Orius* for America north of Mexico. Herring (1966b) revised *Orius* for the Western Hemisphere, and indicated that *O. insidiosus* occurred over much of eastern North America, south through Mexico and Central and South America and onto the West Indies. Henry (1988) reported the species from many provinces and states. This is a common species in many agricultural environments (Lattin 1999b, 2000). Scudder and Footitt (2006) stated that *Orius insidiosus* was introduced from eastern North America into greenhouses in British Columbia to control thrips. While this effort was successful, they reported that some bug individuals have escaped the greenhouses. Thus far, there was no evidence that the species had become established in the wild.

*Orius (Heterororius) minutus* (Linnaeus 1758) was described from Europe. Tonks (1953) first reported it from America north of Mexico, based on specimens from southern British Columbia, as did

Downes (1957). Anderson (1962b) recorded it from British Columbia, Oregon and Washington as did Kelton (1963, 1978), Herring (1966b) and Henry (1988). Péricart (1972) treated this species in the western Palearctic and Lattin et al. (1989) reviewed the species in the Pacific Northwest, including biology and illustrations of the adult and nymph. Barnes et al. (2000) cited British Columbia, as did Scudder and Footitt (2006). It has been taken on caneberry vines where it feeds on insects and mites (Lattin et al. 1989).

*Paratriphleps laeviuscula* Champion, 1900, was described from Panama. It is now known from Honduras (Drake and Harris 1926) (see the discussion by Barber, 1939 on some taxonomic problems with *Paratriphleps*). Bachelier and Baranowski (1975) described the biology of the species where it appeared to feed only on flowers. Hambleton (1944) and Wille (1951) had stated that this was a predaceous species in Peru, but Herring (in Bachelier and Baranowski (1975)) stated that the Peru specimens were not *P. laeviuscula*. Henry (1988) reported it from Puerto Rico, Mexico and Panama, besides Florida and Carpentero et al. (1997) added Nicaragua. Lattin (2006b) deleted records of *P. pallida* (Reuter 1884) from America north of Mexico.

#### XYLOCORINI

*Xylocoris (Arrostelus) flavipes* (Reuter 1875) was described from Algeria. Bibby (1961) first reported it from North America (Arizona). Jay et al. (1968) published on its biology in Georgia as did Awadallah and Tawfik (1972) in Egypt. Péricart (1972) provided an account of the species western Palearctic. Arbogast (1975, 1979) wrote on its biology and Henry (1988) reported *X. flavipes* from Arizona, District of Columbia, Georgia, Kansas, Maryland and Texas besides Africa, Asia, Australia, Europe and South America. Lattin (2000)

discussed this species from a world perspective. It is commonly associated with food products, likely explaining its widespread distribution.

*Xylocoris (Proxylocoris) galactinus* (Fieber 1837) was described from southern Europe. Van Duzee (1905) first recorded this species from America north of Mexico (New York). Anderson (1962b) reported it from Idaho and Oregon. Carayon (1972) included it in his study of *Xylocoris*, and Péricart (1972) reviewed it in the western Palearctic Region. Henry (1988) reported it from Alberta, British Columbia, California, Florida, Georgia, Idaho, Illinois, Manitoba, Missouri, New Jersey, New York, Ontario, Quebec, and Saskatchewan. Dunkel and Ivie (1994) added Montana where specimens of *X. galactinus* were taken in spilled grain. I have identified this species from Oregon. Lattin (2000) included this species in his review of economically important Anthocoridae. This is clearly a non-indigenous species in our area where it is often taken in stored grain.

*Xylocoris (Proxylocoris) sordidus* (Reuter 1871) was described from Brazil and Texas. Champion (1900) reported it from Mexico, British Honduras, Guatemala, Panama, Brazil and the Antilles (Grenada and St. Vincent). Van Duzee (1903) recorded this species based on specimens from New Mexico. Arbogast et al. (1983, 1985) provided biological information on the species in stored peanuts in Georgia. Henry (1988) listed this species from Arizona, California, Florida, Georgia, Kansas, Massachusetts, Maryland, New Jersey, New Mexico, New York, Pennsylvania, South Carolina, Tennessee, and Texas besides its natural range in Mexico, Central and South America, and the West Indies. It is associated with stored foodstuff in the United States.

*Xylocoris (Xylocoris) cursitans* (Fallén 1807) was described from Sweden. Van

Duzee (1916) first recorded this species in North America from eastern Canada and United States. Sands (1957) figured the egg and a nymph and Anderson (1962b) recorded it from British Columbia, Idaho, and Oregon. Carayon (1972) included this species in his review of *Xylocoris* and Péricart (1972) provided an account of the species in the western Palearctic. Kelton (1978) reported this species from Alberta, British Columbia, Nova Scotia, Ontario, and Quebec and Henry (1988) added Connecticut, Idaho, Indiana, Michigan, New Jersey, New York, and Oregon. Lattin and Stanton (1992) reported it from Washington. Lattin (2000) discussed *Xylocoris cursitans* and suggested that it may occur naturally in the Nearctic but that it also may have been introduced subsequently in international commerce. It occurs in both fully winged and brachypterous individuals in both regions. It is usually found under the bark of dead trees. I have taken both forms under the bark of old conifer logs in western Oregon.

*Xylocoris (Xylocoris) vicarius* (Reuter) (1884) was described from Colombia. Van Duzee (1916) first reported it in North America. Torre-Bueno (1930) indicated that the species was found under bark and Anderson (1962b) recorded it from British Columbia with some hesitation, suggesting that his specimen might be a macropterous adult of *X. cursitans*. Henry (1988) recorded it from Florida, Massachusetts, New Jersey and New York besides South America.

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#### LITERATURE CITED

- Anderson, N. H. 1962a. Bionomics of six species of *Anthocoris* (Heteroptera: Anthocoridae) in England. Transactions of the Royal Entomological Society of London 114(3): 67–95.
- . 1962b. Anthocoridae of the Pacific Northwest with notes on distributions, life histories, and habits (Heteroptera). The Canadian Entomologist 94: 1325–1334.
- Anderson, N. H. and L. A. Kelton. 1963. A new species of *Anthocoris* from Canada, with distribution records for three other species (Heteroptera: Anthocoridae). The Canadian Entomologist 95: 439–442.
- Arbogast, R. T. 1975. Population growth of *Xylocoris flavipes*: influence of temperature and humidity. Environmental Entomology 4: 825–831.
- . 1979. The biology and impact of the predatory bug *Xylocoris flavipes* (Reuter). Proceedings of the Second International Working Conference on Stored-Product Entomology. Ibadan, Nigeria, September 1978. pp. 91–105.
- . 1984. Demography of the predatory bug *Dufouriellus ater* (Hemiptera: Anthocoridae). Environmental Entomology 13: 990–994.
- Arbogast, R. T., B. R. Flaherty, and J. W. Press. 1983. Demography of the predaceous bug *Xylocoris sordidus* (Reuter). American Midland Naturalist 109: 398–405.
- Arbogast, R. T., B. R. Flaherty, R. V. Byrd, and J. W. Press. 1985. Developmental stages of *Xylocoris sordidus* (Hemiptera: Anthocoridae). Entomological News 96: 53–58.
- Asquith, A. and J. D. Lattin. 1990. *Brachysteles parvicornis* (Costa), a species of Anthocoridae new to North America (Hemiptera: Heteroptera). Journal of the New York Entomological Society 98: 352–356.
- Awadallah, K. T. and M. F. S. Tawfik. 1972. The biology of *Xylocoris* (= *Piezostethus*) *flavipes* (Reut.) (Hemiptera: Anthocoridae). Bulletin de la Société Entomologique d'Égypte 56: 177–189.
- Awadallah, K. T., M. F. S. Tawfik, N. Abou-Zeid, and M. M. El-Husseini. 1984. The life history of *Dufouriellus ater* (Duf.) (Hemiptera: Anthocoridae). Bulletin de la Société Entomologique d'Égypte 63: 191–197.
- Bachelier, J. S. and R. M. Baranowski. 1975. *Paratriphleps laeviusculus*, a phytophagous anthocorid new to the United States (Hemiptera: Anthocoridae). Florida Entomologist 58: 157–163.

- Barber, H. G. 1939. Insects of Porto Rico and the Virgin Islands. New York Academy of Sciences 14: 263–441.
- Barnes, D. I., H. E. Maw, and G. G. E. Scudder. 2000. Early records of alien species of Heteroptera (Hemiptera: Prosorrhyncha) in Canada. *Journal of the Entomological Society of British Columbia* 97: 95–102.
- Bennett, F. D. 1995. *Montandoniola moraguesi* (Hemiptera: Anthocoridae), a new immigrant to Florida: Friend or foe? *Vedalia* 2: 3–6.
- Bibby, F. F. 1961. Notes on miscellaneous insects of Arizona. *Journal of Economic Entomology* 54: 324–333.
- Blatchley, W. S. 1925. Some additional new species of Heteroptera from the southern United States, with characterization of a new genus. *Entomological News* 36: 45–52.
- . 1926. Heteroptera or True Bugs of Eastern North America with Especial Reference to the Faunas of Indiana and Florida. Nature Publishing Company, Indianapolis. 1116 pp.
- . 1928. Notes on the Heteroptera of eastern North America with descriptions of new species. I. *Journal of the New York Entomological Society* 36: 1–23.
- . 1934. Notes on collection of Heteroptera taken in winter in vicinity of Los Angeles, California. *Transactions of the American Entomological Society* 60: 1–16.
- Brenner, G. J. and J. D. Lattin. 2001. Notes on three species of Anthocoridae (Hemiptera: Heteroptera) from Hawaii, including the first record of *Buchananiella continua* (White). *Proceedings of the Entomological Society of Washington* 103: 386–388.
- Brunner, J. F. and E. C. Burts. 1975. Searching behavior and growth rates of *Anthocoris nemoralis* (Hemiptera: Anthocoridae). *Annals of the Entomological Society of America* 68: 311–315.
- Carayon, J. 1972. Le genre *Xylocoris*: Subdivision et espèces nouvelles (Hem. Anthocoridae). *Annales de la Société Entomologique France (N.S.)* 8: 579–606.
- Carayon, J. and F. Remade. 1962. Note sur la présence en France et en Italie de *Montandoniola moraguesi* (Puton) avec quelques observations sur cet Hétéroptère Anthocoridé. *Bulletin de la Société Entomologique de France* 67: 207–211.
- Carpintero, D. L., J. M. Maes, and M. D. del Coscaron. 1997. Catalogo de los Anthocoridae (Heteroptera) de Nicaragua. *Revista Nicaraguensis de Entomologia* 41: 23–28.
- Champion, G. C. 1897–1901. Insecta: Rhynchota (Hemiptera - Heteroptera). Vol. II. *In* Godman and Salvin, eds. *Biologica Centrali-Americana*. London, 1900: pp. 305–344.
- Clark, R. G., D. O. Greenbank, D. G. Bryant, and J. W. E. Harris. 1971. 36. *Adelges piceae* (Ratz.) Balsam woolly aphid (Homoptera: Adelgidae), pp. 113–127. *In* Biological control programmes against insects and weeds in Canada 1959–1968. Technical Communication No. 4. Commonwealth Institute of Biological Control, Trinidad. 266 pp.
- Clausen, C. P. 1978. Chermidae, pp. 49–55. *In* Clausen, C. P., ed. *Introduced parasites and predators of arthropod pests and weeds: A world review*. U.S. Department of Agriculture, Agricultural Research Service, Agriculture Handbook No. 480. 545 pp.
- Coombs, E. M., J. K. Clark, G. L. Piper, and A. F. Cofrancesco, Jr., eds. 2004. *Biological Control of Invasive Plants in the United States*. Oregon State University Press, Corvallis. 467 pp.
- Costa, A. 1847. *Cimicum regni Neapolitanti centuria secunda, decas prima, secunda, tertia, quarta et quinta*. Napoli. 43 pp.
- Cox, G. W. 1999. *Alien Species in North America and Hawaii: Impacts on Natural Ecosystems*. Island Press, Washington, D.C. 387 pp.
- . 2004. *Alien Species and Evolution*. Island Press, Washington, D.C. 377 pp.
- Dallas, W. S. 1851–1852. List of the specimens of Hemipterous insects in the collection of the British Museum. Taylor and Francis Incorporated, London 1851: 1–368, plates 1–11; 2: 369–592, plates 12–15.
- Davis, C. J. and N. L. H. Krauss. 1966. Recent introductions for biological control in Hawaii - XI. *Proceedings, Hawaiian Entomological Society* 19: 201–207.
- Devine, R. S. 1998. *Alien Invasion*. National Geographic. Washington, D.C. 280 pp.
- Dobbs, T. T. and D. W. Boyd, Jr. 2006. Status and distribution of *Montandoniola moragesi* (Hemiptera: Anthocoridae) in the continental United States. *Florida Entomologist* 89: 41–46.
- Downes, W. 1957. Notes on some Hemiptera which have been introduced into British Columbia. *Proceedings of the Entomological Society of British Columbia* 54: 11–13.
- Drake, C. J. and H. M. Harris. 1926. Notes on American Anthocoridae with descriptions of new forms. *Proceedings of the Biological Society of Washington* 39: 33–46.
- Dreistadt, S. H. and K. S. Hagen. 1994. Classical biological control of the Acacia psyllid, *Achizya uncatoides* (Homoptera: Psyllidae) and predator-prey-plant interactions in the San Francisco Bay Area. *Biological Control* 4: 319–327.
- Dufour, L. 1833. *Memoire sur les genres Xylocoris, Leptopus et Velia*. *Annales de la Société Entomologique de France* 2: 104–118, 1 plate.



- Dunkle, F. V. and M. A. Ivie. 1994. *Xylocoris galactinus* (Fieber) (Hemiptera: Anthocoridae) newly discovered in Montana stored grain. *Pan-Pacific Entomologist* 70: 327–328.
- Elton, C. S. 1958. *The Ecology of Invasions by Animals and Plants*. Methuen and Company, LTD, London. 181 pp.
- Fabricius, J. C. 1794. *Entomologia systematica emendata et aucta, secundum classes, ordines, genera, species, adjectis synonymis, loci, observationibus*. C.G. Proft, Hafniae 4: i–vi, 1–472.
- Fallén, C. F. 1807. *Monographia Cimicum Sveciae*. Apud C.G. Proft, Hafniae. 123 pp.
- Fieber, F. X. 1836–1837. Beiträg zur Kenntnis der Schnabelkerfe (Rhychota). *In* Beiträge zur gesammten Natur-und Heilwissenschaft (Weilenweber, W.R.). Barth, Prague, 1(1) 1836: pp. 97–111; 1837: pp. 337–355.
- . 1860. Exegesen in Hemiptera. *Wiener Entomologische Monatschrift* 4: 257–272.
- Ghauri, M. S. K. 1964. Notes on the Hemiptera from Pakistan and adjoining areas. *Annals and Magazine of Natural History* (13)7: 673–688.
- Hagen, K. S. and S. H. Driestadt. 1990. First California record for *Anthocoris nemoralis* (Fabr.) (Hemiptera: Anthocoridae), a predator important in the biological control of psyllids (Homoptera: Psyllidae). *Pan-Pacific Entomologist* 66: 323–324.
- Hambleton, E. J. 1944. *Heliothis virescens* as a pest of cotton, with notes on host plants in Peru. *Journal of Economic Entomology* 37: 660–666.
- Henry, T. J. 1988. Family Anthocoridae, pp. 12–28. *In* Henry, T. J. and R. C. Froeschner, eds. *Catalog of the Heteroptera, or True Bugs, of Canada and the Continental United States*. E.J. Brill, Leiden. 958 pp.
- Herring, J. L. 1966a. The correct name for an anthocorid predator of the Cuban laurel thrips (Hemiptera: Anthocoridae). *Proceedings of the Entomological Society of Washington* 68: 93.
- . 1966b. The genus *Orius* of the Western Hemisphere (Hemiptera: Anthocoridae). *Annals of the Entomological Society of America* 59: 1093–1109.
- Hill, A. R. 1957. The biology of *Anthocoris nemorum* (L.) in Scotland (Hemiptera: Anthocoridae). *Transactions of the Royal Entomological Society, London* 109: 379–394.
- Horton, D. R., T. M. Lewis, and D. A. Broers. 2004. Ecological and geographic range expansion of the introduced predator *Anthocoris nemoralis* (Hemiptera: Anthocoridae) in North America: Potential for non-target effects? *American Entomologist* 50: 18–30.
- Horváth, G. 1907. Hemiptera nova minus cognita e regione palaeartica. *Annales Historico-Naturales Musei Nationalis Hungarici* 5: 289–323.
- Jakovlev, V. E. 1877. True bugs (Heteroptera: Heteroptera) of northern Persia. *Trudy Russkogo Entomologicheskogo Obshchestva* 10: 67–98. (in Russian and German).
- Jay, E., R. Davis, and S. Brown. 1968. Studies on the predaceous habits of *Xylocoris flavipes* (Reuter) (Hemiptera: Anthocoridae). *Journal of the Georgia Entomological Society* 3: 126–130.
- Kelton, L. A. 1963. Synopsis of the genus *Orius* Wolff in America north of Mexico (Heteroptera: Anthocoridae). *The Canadian Entomologist* 95: 631–636.
- . 1967. Synopsis of the genus *Lycotocoris* in North America and description of a new species from Quebec (Heteroptera: Anthocoridae). *The Canadian Entomologist* 99: 807–814.
- . 1977. New species of *Cardiastethus* Fieber and *Melanocoris* Champion, and new records of European *Acomporis* Reuter and *Temmostethus* Fieber in Canada (Heteroptera: Anthocoridae). *The Canadian Entomologist* 109: 243–248.
- . 1978. The insects and arachnids of Canada and Alaska. Heteroptera: Anthocoridae. Research Branch, Canada Department of Agriculture, Publication 1639. 101 pp.
- Kirby, P. 1999. *Buchananiella continua* (B. White). (Hemiptera: Anthocoridae) established in Britain. *British Journal of Entomology and Natural History* 12: 221–223.
- Kirkaldy, G. W. 1902. Hemiptera. Fauna Hawaiiensis 3: 93–174, plates iv–v.
- Lattin, J. D. 1993. *Brachysteles parvicornis* (Costa), an Anthocoridae new to Canada (Hemiptera: Heteroptera). *The Canadian Entomologist* 125: 965–966.
- . 1999a. Dead leaf clusters as habitats for adult *Calliodis temmostethoides* and *Cardiastethus luridellus* and other anthocorids (Hemiptera: Heteroptera: Anthocoridae). *Great Lakes Entomologist* 32: 33–38.
- . 1999b. Bionomics of the Anthocoridae. *Annual Review of Entomology* 44: 207–31.
- . 2000. Minute pirate bugs (Anthocoridae), pp. 607–637. *In* Schaefer, C. W. and A. R. Panizzi, eds. *Heteroptera of Economic Importance*. CRC Press, Boca Raton. 828 pp.
- . 2005. *Physopleurella floridana* Blatchley, 1925, a synonym of *Physopleurella mundula* (White, 1877) (Hemiptera: Heteroptera: Cimicoidea: Anthocoridae). *Proceedings of the Entomological Society of Washington* 107: 460–462.
- . 2006a. *Nesidiocheilus hawaiiensis* Kirkaldy, 1902, a synonym of *Acanthia campestris* Fabricius, 1794 (Hemiptera: Heteroptera: Lycotocoridae). *Proceedings of the Entomological Society of Washington* 108: 240.

- . 2006b. Deletion of *Paratriphleps pallida* (Reuter) from the United States fauna (Hemiptera: Heteroptera: Anthocoridae). Proceedings of the Entomological Society of Washington 108: 477–478.
- . 2007. The Lasiochilidae, Lyctocoridae and Anthocoridae (Hemiptera: Heteroptera) of the Hawaiian Islands: Native or Introduced? Proceedings of the Entomological Society of Washington 109: 75–80.
- Lattin, J. D. and A. Asquith. 1991. Contemporary records of *Brachysteles parvicornis* (Costa) in the United States (Hemiptera: Heteroptera). Journal of the New York Entomological Society 99: 240–241.
- Lattin, J. D., A. Asquith, and S. Booth. 1989. *Orius minutus* (Linnaeus) in North America (Hemiptera: Heteroptera: Anthocoridae). Journal of the New York Entomological Society 97: 409–416.
- Lattin, J. D. and J. R. LaBonte. 2002. *Cardiastethus luridellus* Fieber (Hemiptera: Heteroptera: Anthocoridae), a non-indigenous anthocorid in Oregon. Proceedings of the Entomological Society of Washington 104: 1064–1065.
- Lattin, J. D. and T. M. Lewis. 2001. *Amphiareus constrictus* (Stål) (Hemiptera: Heteroptera: Anthocoridae) from California: Clarification of previous record and citation. Proceedings of the Entomological Society of Washington 103: 334–338.
- Lattin, J. D., T. M. Lewis, and D. R. Horton. 2001. *Buchananiella continua* (White) from California with new synonymy (Hemiptera: Heteroptera: Anthocoridae). Proceedings of the Entomological Society of Washington 103: 558–560.
- Lattin, J. D. and N. L. Stanton. 1992. A review of the species of Anthocoridae (Hemiptera: Heteroptera) found on *Pinus contorta*. Journal of the New York Entomological Society 100: 424–479.
- Lewis, T. M., D. R. Horton, and D. A. Broers. 2005. New United States records for Anthocoridae (Hemiptera: Heteroptera). Pan-Pacific Entomologist 81(1–2): 59–67.
- Linnaeus, C. 1758. Systema naturae per regna tria naturae, secunqum classes, ordines, genera, species, cum characteribus differentiis, synonymis locis. Editio decima reformata. Laurentii Salvii, Holmiae I: 1–823, i–iii. (Hemiptera pp. 434–457).
- . 1761. Fauna Svecica sistens animalia Sveciae regni. 578 pp.
- Maw, H. E. L., R. G. Foottit, K. G. A. Hamilton, and G. E. Scudder. 2000. Checklist of the Hemiptera of Canada and Alaska. N.R.C. Research Press, Ottawa, Canada. 220 pp.
- McMullen, R. D. 1971. 16. *Psylla pyricola* Förster, pear psylla (Hemiptera: Psyllidae), pp. 33–38. In Biological Control programmes against insects and weeds in Canada 1959–1968. Commonwealth Institute of Biological Control, Trinidad, Technical Communication No. 4. 266 pp.
- McMullen, R. D. and C. Jong. 1967. New records and discussion of predators on the pear psylla, *Psylla pyricola* Förster, in British Columbia. Journal of the Entomological Society of British Columbia 64: 35–40.
- Mitchell, R. G. and K. H. Wright. 1967. Foreign predator introductions for control of the balsam woolly aphid in the Pacific Northwest. Journal of Economic Entomology 60: 142–147.
- Mooney, H. A. and J. A. Drake, eds. 1984. Ecology of Biological Invasions of North America and Hawaii. Springer-Verlag, New York. 321 pp.
- Mooney, H. A. and R. J. Hobbs. 2000. Invasive Species in a Changing World. Island Press, Washington, D.C. 457 pp.
- Mooney, H. A., R. N. Mack, J. A. McNeely, L. E. Neville, P. J. Schei, and J. K. Waage, eds. 2005. Invasive Alien Species. Scope 63, Island Press, Washington. 368 pp.
- Paine, T. D. 1992. Cuban lural thrips (Thysanoptera: Phlaeothripidae) biology in southern California: Seasonal abundance, temperature dependent development, leaf suitability and predation. Annals of the Entomological Society of America 85: 164–172.
- Parshley, H. M. 1917. A species of *Macrotracheliella* found in New England (Hemip. Anthocoridae). Entomological News 28: 37–38.
- Parsons, P. A. 1983. The Evolutionary Biology of Colonizing Species. Cambridge University Press, Cambridge. 262 pp.
- Péricart, J. 1972. Faune de l'Europe et du Bassin Méditerranéen. No. 7. Hémiptères Anthocoridae, Cimicidae et Microphysidae de l'Ouest - Paléarctique. Masson et Cie Editeurs, Paris, France. 402 pp.
- . 1996. Family Anthocoridae Fieber, 1836, pp. 108–140. In Aukema, B. and C. Rieger, eds. Catalogue of the Heteroptera of the Palearctic Region. Volume 2. Cimicomorpha 1. 361 pp. Netherlands Entomological Society, Amsterdam, The Netherlands.
- Procter, W. 1946. Biological survey of the Mount Desert Region. Part VII. The Insect Fauna. Wistar Institute of Anatomy and Biology, Philadelphia. 566 pp. (Hemiptera: Heteroptera pp. 66–83).
- Puton, A. 1896. Hémiptères nouveaux. Revue d'Entomologie 15: 233–234.

- Reimer, N. J. 1988. Predation of *Lithothrips urichi* Karney (Thysanoptera: Phlaeothripidae) a case of biotic interference. *Environmental Entomology* 17: 132–134.
- Reuter, O. M. 1871. Acanthiidae americanae, descriptae. Öfversigt af Kongliga Svenska Vetenskaps - Akademiens Förhandlingar 28: 557–567. Pl.7.
- . 1875. Genera Cimicidarum Europe. Bi-hang till Kongliga Svenska Vetenskaps - Akademiens Handlingar 3: 1–66.
- . 1884. Monographia Anthocoridarum Orbis Terrestris. 1–204. Helsingforsiae (also Acta Societatis Scientiarum Fennicae 14(1885): 555–758.
- Ruiz, G. M. and J. T. Carlton, eds. 2003. *Invasive Species*. Island Press, Washington, D.C. 518 pp.
- Sands, W. A. 1957. The immature stages of some British Anthocoridae (Hemiptera). *Transactions of the Royal Entomological Society of London* 109: 295–310, 5 figs.
- Say, T. 1832. Descriptions of new species of heteropterous Hemiptera of North America. New Harmony, Indiana. 30 pp.
- Schuh, R. T. and J. A. Slater. 1995. *True bugs of the world (Hemiptera: Heteroptera): Classification and natural history*. Comstock Publishing Associates, Cornell University Press, Ithaca and London. 336 pp.
- Schuh, R. T. and P. Štys. 1991. Phylogenetic analysis of cimicomorphan family relationships (Heteroptera). *Journal of the New York Entomological Society* 99: 298–350.
- Scudder, G. G. E. 1986. Additional Heteroptera new to British Columbia. *Journal of the Entomological Society of British Columbia* 83: 63–65.
- Scudder, G. G. E. and R. G. Foottit. 2006. Alien true bugs (Hemiptera: Heteroptera) in Canada: Composition and adaptations. *The Canadian Entomologist* 138: 24–51.
- Simberloff, D., D. C. Schmitz, and T. C. Brown, eds. 1997. *Strangers in Paradise*. Island Press, Washington, D.C. 467 pp.
- Stål, C. 1860–1862. Bidrag till Rio Janeiro trakens Hemipter-fauna. Kongliga Svenska Vetenskaps - Akademiens Handlingar 2(7): 1–84 (1860); 3(6): 1–75 (1862).
- Stanaway, M. A., M. P. Zalucki, P. S. Gillespie, C. M. Rodriguez, and G. V. Maynard. 2001. Pest risk assessment of insects in sea cargo containers. *Australian Journal of Entomology* 40: 180–192.
- Tonks, N. V. 1953. Annotated list of insects and mites collected on brambles in the lower Frazer Valley, British Columbia, 1951. *Proceedings of The Entomological Society of British Columbia* 49: 27–28.
- Torre-Bueno, J. R. de la. 1930. Records of Anthocoridae, particularly in New York. *Bulletin of the Brooklyn Entomological Society* 25: 11–20.
- U.S. Congress, Office of Technology Assessment. 1993. *Harmful non-indigenous species in the United States, OTA-F-565*. Washington, D.C. 391 pp.
- Van Duzee, E. P. 1903. Hemiptera of Beulah, New Mexico. *Transactions of the American Entomological Society* 29: 107–113.
- . 1905. Hemiptera taken in the Adirondack Mountains. *New York State Museum Bulletin* 97: 546–556.
- . 1916. Checklist of the Hemiptera (excepting the Aphididae, Aleurodidae and Coccidae) of America, North of Mexico. *New York Entomological Society, New York*. 111 pp.
- Verdcourt, B. 2005. Some insects breeding in plastic compost sacks. *Entomologist's Monthly Magazine* 141: 124.
- White, F. B. 1877. Descriptions of new species of heteropterous Hemiptera collected in the Hawaiian Islands by the Rev. T. Blackburn. No. 1. *Annals and Magazine of Natural History* (4)5: 110–114.
- . 1879–1880. Descriptions of new Anthocoridae. *Entomologist's Monthly Magazine* 16: 142–148.
- Whitehead, P. F. 2005a. *Buchananiella continua* (Buchanan White, 1880) (Hem., Anthocoridae) new to Worcestershire (VC37) and Yorkshire (VC61). *Entomologist's Monthly Magazine* 141: 166.
- . 2005b. Observations on the invertebrate coenoses of cypress trees in cultivation (Cupressaceae). *Entomologist's Monthly Magazine* 141: 248.
- Wille, J. E. 1951. Biological control of certain cotton insects and the application of new organic insecticides in Peru. *Journal of Economic Entomology* 44: 13–18.